Stanford

Lydia-Marie Joubert

Staff Scientist, SLAC National Accelerator Laboratory

NIH Biosketch available Online

SUPERVISORS

- Wah Chiu

Bio

BIO

Dr Lydia-Marie Joubert received her BSc (Mathematics and Botany), Hons.BSc and MSc (Botany) from Stellenbosch University, South Africa, where she was born and raised. Her PhD was co-supervised by prof. Jan Coetzee (Pretoria University SA) and prof. Paul Mahlberg, (Indiana University, Bloomington, USA) where she performed the most significant component of her postgraduate research. Her international scientific career was launched during her MSc studies, with an internship at Weizmann Institute, Israel, under mentorship of prof. Dan Atsmon in Plant Genetics. Her postgraduate studies focused on monoterpene biosynthesis and trichome development in the genus Pelargonium, and techniques of electron microscopy and gas chomatography were further explored and developed. After postdoctoral studies in plant-microbial symbiosis, Dr. Joubert moved towards Environmental Microbiology with a research focus on microbial biofilms and their practical application especially in bioenergy production and wastewater remediation. Ultrastructural TEM and SEM application runs as a thread throughout her research. After moving to the USA she joined Stanford University as Sr Research Professional and lead scanning electron microscopist in life sciences, with a strong focus on technique development for hydrogel and biomaterial imaging, as well as array tomography and serial volume (3D) imaging. Correlative light and electron, as well as X-ray microscopy, were further explored and developed. In 2017 Dr. Joubert moved back to Stellenbosch as head of Electron Microscopy and associate professor in Microbiology. In addition to leading the main EM Unit in Stellenbosch, she started an EM unit at the Medical School in Tygerberg, Cape Town, with the acquisition of an Apreo Volumescope for 3D and conventional SEM and TEM application.

She moved back to Stanford at the end of 2019 to join the Stanford SLAC Cryo-EM Center (S2C2) under leadership of prof. Wah Chiu. She has since been promoted to the position of Director of Operations at the Cryo-ET Center (SCSC), which focuses on application and training in cryo-Electron Tomography. She additionally develops workflows in cryoFIB-SEM as tool for cryo-ET sample preparation, 'slice and view' 3D data collection and correlated light and electron microscopy under cryogenic conditions. Her personal research focus returned to plant and microbial studies in cellulosic bio-energy, as well as fundamental aspects of mitochondria development in health and disease. She has a keen interest in visualization and has won numerous awards in scientific imaging contests. Her electron micrographs regularly feature on the front cover of scientific journals. She was appointed as Professor Extraordinary in Microbiology at Stellenbosch University, where she continues to support the development of Electron Microscopy in Life and Medical Sciences. She lives in Los Altos, California.

CURRENT ROLE AT STANFORD

Director of Operations, Stanford SLAC Cryo-ET Center

Staff Scientist

HONORS AND AWARDS

- Winner of SA Science Lens Competition (Category: Science as Art), National Research Foundation, SA. (2017)
- Winner of Science Visualization Challenge (Category: People's Choice), National Science Foundation (2013)
- Professional Staff Technologist Award, Microscopy Society of America (MSA) (2009)
- Honorable Mention Olympus Bioscapes Scientific Photo Contest, Olympus Life Sciences (2005)
- Honorary Stipendium for highest postgraduate achievement in Life Sciences, Stellenbosch University (2003)
- Claude Leon Foundation Merit Fellowship, Claude Harris Leon Foundation (2002-2004)
- SU Merit Award for MPihil in Higher Education, Stellenboich University (2001 – 2002)
- Croll Memorial Stipendium, Stellenbosch University (1984-85)
- CSIR Merit Scholarship, Counsil for Scientific and Industrial Resreach (1983 – 1986)
- International Exchange Scholarship to Weizmann Institute, Weizmann Institute, Israel (1980-81)
- Shell Scholarship, Shell Oil (1978-1980)
- Mathematics Olympiad finalist, Old Mutual, SA (1976)
- President's Award for Youth Leadership, Voortrekkers (1976)

EDUCATION AND CERTIFICATIONS

- BSc, Stellenbosch University , Mathematics, Botany, Biochemistry (1979)
- PhD, Indiana University and University of Pretoria , Plant Sciences, Electron Microscopy (1986)
- MSc, Stellenbosch University , Plant Sciences (1983)
- MPhil, University of Stellenbosch , Higher Education (2002)

Professional

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Professor Extraordinary, Stellenbosch University (2019 - present)
- Member, Wellcome Trust Bioimaging Expert Review Committee (2024 - present)
- Member, Stanford cryo-Electron Microscopy Center (cEMc) Advisory Committee (2024 - present)
- Member, Women In Autophagy-COmmunity and MenthorshiP for African ScientistS (WIA-COMPASS). (2024 - present)
- Member, NSLS-II BEPSD Bioimaging and Artificial Intelligence Planning Committee (2025 - present)
- Member, African BioImaging Consortium (ABIC) (2023 - present)

Publications

PUBLICATIONS

- **Cryoprotectant-assisted plunge freezing of thick brain tissue specimens for targeted physiologically relevant cryo-imaging in situ**
  Weier, A., Perez, L., Gao, F., Morgan, E., Liu, P., Mounteer, I., Morgan, G., Shi, Q., Vigil, F., Joubert, L., Stowell, M. H. B., Hoenger, A., Klykov, et al
  CELL PRESS.2026: 99a

- **Dual Contrast-Enhanced Microcomputed Tomography Uncovers Leaflet-Dependent Patterns of Macrocalcification, Fibrous Extracellular Matrix Remodeling, and Adipocyte Degeneration in Calcific Aortic Stenosis.** *Journal of the American Heart Association*
  El Zeini, M., Tacco, I. R., Jimenez, J. I., Kabiri, A., Vailionis, A., Perrino, J., Burns, D., Jensen, K. C., Burdon, T. A., Shudo, Y., Woo, Y. J., Liang, T., Alexander, et al
  2025: e040616

- **Cryoprotectants-assisted plunge freezing of thick brain tissue specimens for targeted physiologically relevant cryo-imaging in situ.** *bioRxiv : the preprint server for biology*
  Weier, A., Perez, L., Gao, F., Morgan, E. T., Liu, P., Mounteer, I. C., Morgan, G. P., Shi, Q., Vigil, F. A., Joubert, L. M., Hoenger, A., Stowell, M. H., Klykov, et al
  2025

- **Cyanobacteria and Chloroflexota cooperate to structure light-responsive biofilms.** *Proceedings of the National Academy of Sciences of the United States of America*
  Bunbury, F., Rivas, C., Calatrava, V., Malkovskiy, A. V., Joubert, L. M., Parvate, A. D., Evans, J. E., Grossman, A. R., Bhaya, D.
  2025; 122 (5): e2423574122

- **Dramatic changes in mitochondrial subcellular location and morphology accompany activation of the CO2 concentrating mechanism.** *Proceedings of the National Academy of Sciences of the United States of America*
  Findinier, J., Joubert, L. M., Fakhimi, N., Schmid, M. F., Malkovskiy, A. V., Chiu, W., Burlacot, A., Grossman, A. R.
  2024; 121 (43): e2407548121

- **Dramatic Changes in Mitochondrial Subcellular Location and Morphology Accompany Activation of the CO2 Concentrating Mechanism.** *bioRxiv : the preprint server for biology*
  Findinier, J., Joubert, L. M., Schmid, M. F., Malkovskiy, A., Chiu, W., Burlacot, A., Grossman, A. R.
  2024

- **Visualizing spatial and temporal responses of plant cells to the environment**
  Zaoralova, M., Azaldegui, C. A., Sica, A. V., Rui, Y., Joubert, L., Dinneny, J., Dahlberg, P. D.
  CELL PRESS.2024: 420A

- **Commensal protists in reptiles display flexible host range and adaptation to ectothermic hosts.** *mBio*
  Gerrick, E. R., DeSchepper, L. B., Mechler, C. M., Joubert, L. -., Dunker, F., Colston, T. J., Howitt, M. R.
  2023: e0227323

- **Commensal protists in reptiles display flexible host range and adaptation to ectothermic hosts.** *bioRxiv : the preprint server for biology*
  Gerrick, E. R., DeSchepper, L. B., Mechler, C. M., Joubert, L. M., Dunker, F., Colston, T. J., Howitt, M. R.
  2023

- **CryoET reveals organelle phenotypes in huntington disease patient iPSC-derived and mouse primary neurons.** *Nature communications*
  Wu, G. H., Smith-Geater, C., Galaz-Montoya, J. G., Gu, Y., Gupte, S. R., Aviner, R., Mitchell, P. G., Hsu, J., Miramontes, R., Wang, K. Q., Geller, N. R., Hou, C., Danita, et al
  2023; 14 (1): 692

- **Visualization of the distribution of covalently cross-linked hydrogels in CLARITY brain-polymer hybrids for different monomer concentrations.** *Scientific reports*
  Malkovskiy, A. V., Tom, A., Joubert, L., Bao, Z.
  2022; 12 (1): 13549

- **Interactions between mTORC2 core subunits Rictor and mSin1 dictate selective and context-dependent phosphorylation of substrate kinases SGK1 and Akt.** *The Journal of biological chemistry*
  Yu, Z., Chen, J., Takagi, E., Wang, F., Saha, B., Liu, X., Joubert, L. M., Gleason, C. E., Jin, M., Li, C., Nowotny, C., Agard, D., Cheng, et al
  2022: 102288

- **Correlative Light and Electron Microscopy (CLEM): Bringing Together the Best of Both Worlds to Study Neuronal Autophagy** *Imaging and Quantifying Neuronal Autophagy*
  Kriel, J., Joubert, L.
  Springer.2022

- **Vision, challenges and opportunities for a Plant Cell Atlas.** *eLife*
  Plant Cell Atlas Consortium, Jha, S. G., Borowsky, A. T., Cole, B. J., Fahlgren, N., Farmer, A., Huang, S. C., Karia, P., Libault, M., Provart, N. J., Rice, S. L., Saura-Sanchez, M., Agarwal, P., et al
  2021; 10

- **SEM and TEM for identification of capsular fibrosis and cellular behavior around breast implants - a descriptive analysis.** *BMC molecular and cell biology*
  Kuehlmann, B., Zucal, I., Bonham, C. A., Joubert, L., Prantl, L.

2021; 22 (1): 25

- **Combining the glioblastoma cell membrane-permeabilizing effect of tumor treating fields with chemotherapy**
  Chang, E., Patel, C., Young, C. J., Flores, T., Joubert, L., Zeng, Y., Sinclair, R., Gambhir, S.
  AMER ASSOC CANCER RESEARCH.2020
- **Genetically targeted chemical assembly of functional materials in living cells, tissues, and animals.** *Science (New York, N.Y.)*
  Liu, J. n., Kim, Y. S., Richardson, C. E., Tom, A. n., Ramakrishnan, C. n., Birey, F. n., Katsumata, T. n., Chen, S. n., Wang, C. n., Wang, X. n., Joubert, L. M., Jiang, Y. n., Wang, et al
  2020; 367 (6484): 1372–76
- **Designed Antimicrobial Peptides for Recurrent Vulvovaginal Candidiasis Treatment.** *Antimicrobial agents and chemotherapy*
  Woodburn, K. W., Clemens, L. E., Jaynes, J., Joubert, L., Botha, A., Nazik, H., Stevens, D. A.
  2019
- **Spatiotemporal Tracking of Brain-Tumor-Associated Myeloid Cells in Vivo through Optical Coherence Tomography with Plasmonic Labeling and Speckle Modulation** *ACS NANO*
  SoRelle, E., Yecies, D., Liba, O., Bennett, F., Graef, C., Dutta, R., Mitra, S., Joubert, L., Cheshier, S., Grant, G. A., de la Zerda, A.
  2019; 13 (7): 7985–95
- **Tumor treating fields increases membrane permeability in glioblastoma cells**
  Chang, E., Patel, C., Pohling, C., Young, C., Song, J., Flores, T. A., Zeng, Y., Joubert, L., Arami, H., Natarajan, A., Sinclair, R., Gambhir, S. S.
  AMER ASSOC CANCER RESEARCH.2019
- **A Combination of Itraconazole and Amiodarone Is Highly Effective against Trypanosoma cruzi Infection of Human Stem Cell-Derived Cardiomyocytes.** *The American journal of tropical medicine and hygiene*
  Sass, G., Madigan, R. T., Joubert, L., Bozzi, A., Sayed, N., Wu, J. C., Stevens, D. A.
  2019
- **Bright sub-20-nm cathodoluminescent nanoprobes for electron microscopy** *NATURE NANOTECHNOLOGY*
  Prigozhin, M. B., Maurer, P. C., Courtis, A. M., Liu, N., Wisser, M. D., Siefe, C., Tian, B., Chan, E., Song, G., Fischer, S., Aloni, S., Ogletree, D., Barnard, et al
  2019; 14 (5): 420-+
- **Integration of electron microscopy and solid-state NMR analysis for new views and compositional parameters of Aspergillus fumigatus biofilms.** *Medical mycology*
  Reichhardt, C., Joubert, L., Clemons, K. V., Stevens, D. A., Cegelski, L.
  2019; 57 (Supplement_2): S239–S244
- **Integration of electron microscopy and solid-state NMR analysis for new views and compositional parameters of Aspergillus fumigatus biofilms** *MEDICAL MYCOLOGY*
  Reichhardt, C., Joubert, L., Clemons, K. V., Stevens, D. A., Cegelski, L.
  2019; 57: S239–S244
- **Bright sub-20-nm cathodoluminescent nanoprobes for electron microscopy.** *Nature nanotechnology*
  Prigozhin, M. B., Maurer, P. C., Courtis, A. M., Liu, N., Wisser, M. D., Siefe, C., Tian, B., Chan, E., Song, G., Fischer, S., Aloni, S., Ogletree, D. F., Barnard, et al
  2019
- **The hippocampal extracellular matrix regulates pain and memory after injury** *MOLECULAR PSYCHIATRY*
  Tajerian, M., Hung, V., Huy Nguyen, Lee, G., Joubert, L., Malkovskiy, A., Zou, B., Xie, S., Huang, T., Clark, J.
  2018; 23 (12): 2302–13
- **Surgical adhesions in mice are derived from mesothelial cells and can be targeted by antibodies against mesothelial markers.** *Science translational medicine*
  Tsai, J. M., Sinha, R., Seita, J., Fernhoff, N., Christ, S., Koopmans, T., Krampitz, G. W., McKenna, K. M., Xing, L., Sandholzer, M., Sales, J. H., Shoham, M., McCracken, et al
  2018; 10 (469)
- **Surgical adhesions in mice are derived from mesothelial cells and can be targeted by antibodies against mesothelial markers** *SCIENCE TRANSLATIONAL MEDICINE*

Tsai, J. M., Sinha, R., Seita, J., Fernhoff, N., Christ, S., Koopmans, T., Krampitz, G. W., McKenna, K. M., Xing, L., Sandholzer, M., Sales, J., Shoham, M., McCracken, et al
2018; 10 (469)

- **The hippocampal extracellular matrix regulates pain and memory after injury.** *Molecular psychiatry*
  Tajerian, M., Hung, V., Nguyen, H., Lee, G., Joubert, L., Malkovskiy, A. V., Zou, B., Xie, S., Huang, T., Clark, J. D.
  2018
- **Single upconversion nanoparticle imaging at sub-10 W cm(-2) irradiance** *NATURE PHOTONICS*
  Liu, Q., Zhang, Y., Peng, C., Yang, T., Joubert, L., Chu, S.
  2018; 12 (9): 548–53
- **Single upconversion nanoparticle imaging at sub-10 W cm-2 irradiance.** *Nature photonics*
  Liu, Q., Zhang, Y., Peng, C. S., Yang, T., Joubert, L. M., Chu, S.
  2018; 12 (9): 548-553
- **Tumor Treating Fields Increases Membrane Permeability in Glioblastoma Cells** *Cell Death Discovery*
  Chang, E., Patel, C. B., Pohling, C., Young, C., Song, J., Flores, T., Zeng, Y., Joubert, L. M., Arami, H., Natarajan, A., Sinclair, R., Gambhir, S. S.
  2018; 4
- **Tumor treating fields increases membrane permeability in glioblastoma cells.** *Cell death discovery*
  Chang, E. n., Patel, C. B., Pohling, C. n., Young, C. n., Song, J. n., Flores, T. A., Zeng, Y. n., Joubert, L. M., Arami, H. n., Natarajan, A. n., Sinclair, R. n., Gambhir, S. S.
  2018; 4: 113
- **Formation of Polymeric Nanocubes by Self-Assembly and Crystallization of Dithiolane-Containing Triblock Copolymers** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
  Margulis, K., Zhang, X., Joubert, L., Bruening, K., Tassone, C. J., Zare, R. N., Waymouth, R. M.
  2017; 56 (51): 16357–62
- **Formation of Polymeric Nanocubes by Self-Assembly and Crystallization of Dithiolane-Containing Triblock Copolymers.** *Angewandte Chemie (International ed. in English)*
  Margulis, K., Zhang, X., Joubert, L., Bruening, K., Tassone, C. J., Zare, R. N., Waymouth, R. M.
  2017
- **Atomic structure of sensitive battery materials and Interfaces revealed by cryo-electron microscopy** *SCIENCE*
  Li, Y., Li, Y., Pei, A., Yan, K., Sun, Y., Wu, C., Joubert, L., Chin, R., Koh, A., Yu, Y., Perrino, J., Butz, B., Chu, et al
  2017; 358 (6362): 506–10
- **Revealing the Cell-Material Interface with Nanometer Resolution by Focused Ion Beam/Scanning Electron Microscopy** *ACS NANO*
  Santoro, F., Zhao, W., Joubert, L., Duan, L., Schnitker, J., van de Burgt, Y., Lou, H., Liu, B., Salleo, A., Cui, L., Cui, Y., Cui, B.
  2017; 11 (8): 8320–28
- **Intratendinous Injection of Hydrogel for Reseeding Decellularized Human Flexor Tendons.** *Plastic and reconstructive surgery*
  Long, C., Galvez, M. G., Legrand, A., Joubert, L., Wang, Z., Chattopadhyay, A., Chang, J., Fox, P. M.
  2017; 139 (6): 1305e-1314e
- **Visualization of Aspergillus fumigatus biofilms with Scanning Electron Microscopy and Variable Pressure-Scanning Electron Microscopy: A comparison of processing techniques** *JOURNAL OF MICROBIOLOGICAL METHODS*
  Joubert, L., Ferreira, J. A., Stevens, D. A., Nazik, H., Cegelski, L.
  2017; 132: 46-55
- **Pseudomonas phage inhibition of Candida albicans.** *Microbiology (Reading, England)*
  Nazik, H. n., Joubert, L. M., Secor, P. R., Sweere, J. M., Bollyky, P. L., Sass, G. n., Cegelski, L. n., Stevens, D. A.
  2017
- **Engulfed cadherin fingers are polarized junctional structures between collectively migrating endothelial cells** *NATURE CELL BIOLOGY*
  Hayer, A., Shao, L., Chung, M., Joubert, L., Yang, H. W., Tsai, F., Bisaria, A., Betzig, E., Meyer, T.
  2016; 18 (12): 1311-?

- **Pf4 bacteriophage produced by Pseudomonas aeruginosa inhibits Aspergillus fumigatus metabolism via iron sequestration** *MICROBIOLOGY-SGM*
  Penner, J. C., Ferreira, J. A., Secor, P. R., Sweere, J. M., Birukova, M. K., Joubert, L., Haagensen, J. A., Garcia, O., Malkovskiy, A. V., Kaber, G., Nazik, H., Manasherob, R., Spormann, et al
  2016; 162 (9): 1583-1594

- **Isolation and trans-differentiation of mesenchymal stromal cells into smooth muscle cells: Utility and applicability for cell-sheet engineering.** *Cytotherapy*
  Shudo, Y., Cohen, J. E., Goldstone, A. B., MacArthur, J. W., Patel, J., Edwards, B. B., Hopkins, M. S., Steele, A. N., Joubert, L., Miyagawa, S., Sawa, Y., Woo, Y. J.
  2016; 18 (4): 510-517

- **Analysis of the Aspergillus fumigatus Biofilm Extracellular Matrix by Solid-State Nuclear Magnetic Resonance Spectroscopy.** *Eukaryotic cell*
  Reichhardt, C., Ferreira, J. A., Joubert, L., Clemons, K. V., Stevens, D. A., Cegelski, L.
  2015; 14 (11): 1064-1072

- **Analysis of the Aspergillus fumigatus Biofilm Extracellular Matrix by Solid-State Nuclear Magnetic Resonance Spectroscopy.** *Eukaryotic cell*
  Reichhardt, C., Ferreira, J. A., Joubert, L., Clemons, K. V., Stevens, D. A., Cegelski, L.
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- **Inner ear hair cell-like cells from human embryonic stem cells.** *Stem cells and development*
  Ronaghi, M., Nasr, M., Ealy, M., Durruthy-Durruthy, R., Waldhaus, J., Diaz, G. H., Joubert, L., Oshima, K., Heller, S.
  2014; 23 (11): 1275-1284

- **Design and Characterization of an Injectable Tendon Hydrogel: A Novel Scaffold for Guided Tissue Regeneration in the Musculoskeletal System** *TISSUE ENGINEERING PART A*
  Farnebo, S., Woon, C. Y., Schmitt, T., Joubert, L., Kim, M., Hung Pham, H., Chang, J.
  2014; 20 (9-10): 1550-1561

- **Promotion of airway anastomotic microvascular regeneration and alleviation of airway ischemia by deferoxamine nanoparticles.** *Biomaterials*
  Jiang, X., Malkovskiy, A. V., Tian, W., Sung, Y. K., Sun, W., Hsu, J. L., Manickam, S., Wagh, D., Joubert, L., Semenza, G. L., Rajadas, J., Nicolls, M. R.
  2014; 35 (2): 803-813

- **External push and internal pull forces recruit curvature-sensing N-BAR domain proteins to the plasma membrane** *NATURE CELL BIOLOGY*
  Galic, M., Jeong, S., Tsai, F., Joubert, L., Wu, Y. I., Hahn, K. M., Cui, Y., Meyer, T.
  2012; 14 (8): 874-U212

- **Airtight container for the transfer of atmosphere-sensitive materials into vacuum-operated characterization instruments** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Gaume, R. M., Joubert, L.
  2011; 82 (12): 123705

- **Elevated AIM2-mediated pyroptosis triggered by hypercytotoxic Francisella mutant strains is attributed to increased intracellular bacteriolysis** *CELLULAR MICROBIOLOGY*
  Peng, K., Broz, P., Jones, J., Joubert, L., Monack, D.
  2011; 13 (10): 1586-1600

- **Adipose tissue-derived stem cells display a proangiogenic phenotype on 3D scaffolds.** *Journal of biomedical materials research. Part A*
  Neofytou, E. A., Chang, E., Patlola, B., Joubert, L., Rajadas, J., Gambhir, S. S., Cheng, Z., Robbins, R. C., Beygui, R. E.
  2011; 98 (3): 383-393

- **Adipose tissue-derived stem cells display a proangiogenic phenotype on 3D scaffolds** *JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART A*
  Neofytou, E. A., Chang, E., Patloia, B., Joubert, L., Rajadas, J., Gambhir, S. S., Cheng, Z., Robbins, R. C., Beygui, R. E.
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- **ChePep Controls Helicobacter pylori Infection of the Gastric Glands and Chemotaxis in the Epsilonproteobacteria** *MBIO*

Howitt, M. R., Lee, J. Y., Lertsethtakarn, P., Vogelmann, R., Joubert, L., Ottemann, K. M., Amieva, M. R.
2011; 2 (4)

- **Contributions of Francisella tularensis subsp novicida Chitinases and Sec Secretion System to Biofilm Formation on Chitin** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*
  Margolis, J. J., El-Etr, S., Joubert, L., Moore, E., Robison, R., Rasley, A., Spormann, A. M., Monack, D. M.
  2010; 76 (2): 596-608

- **Visualization of Hydrogels with Variable-Pressure SEM**
  Joubert, L.
  CAMBRIDGE UNIV PRESS.2009: 1308–9